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EXAMINER

LESLIE, MICHAEL S

ART UNIT

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3745

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/814,506	Applicant(s) PARK ET AL.	
	Examiner Michael Leslie	Art Unit 3745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Objections

Claims 1, 3, 4, 7, 10, 17, 18, 20, 21, and 26 are objected to because of the following informalities: Claim 1, Line 4, --in-- should be inserted after “reciprocating”, Line 12, “the crankshaft” should be --a crankshaft--; Claim 3, Line 1, “two the guide” should be --two guide--; Claim 4, Line 2, “grater” should be --greater--; Claim 7, Line 2, --of-- should be inserted after “radius”; Claim 10, Line 7, “the crankshaft” should be --a crankshaft--; Claim 17, Line 2, --(h)-- should be inserted after “height”; Claim 18, Line 4, --in-- should be inserted after “reciprocating”, Line 7, “a head” should be --the head--, Line 15, “the crankshaft” should be --a crankshaft--; Claim 20, Line 2, “grater” should be --greater--; Claim 21, Line 2, --of-- should be inserted after “radius”; Claim 26, Line 2, --(h)-- should be inserted after “height”. Appropriate correction is required.

Reference characters corresponding to elements recited in the detailed description of the drawings and used in conjunction with the recitation of the same element or group of elements in the claims should be enclosed within parentheses so as to avoid confusion with other numbers or characters which may appear in the claims (Claims 16, 17, 25, and 26). See MPEP § 608.01(m).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4, 8, 9 17, 20, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4 & 20 recite the limitation "the guide surface" in line 1. There is insufficient antecedent basis for this limitation in the claim. Claims 1 and 18 recite "guide surfaces", but no single guide surface is referenced.

Claim 8 recites that the skirt has an elliptical curvature, directed toward the embodiment of Fig. 6, while parent claim 7 is directed toward the different and conflicting embodiment of Fig. 5. It appears that claim 8 should depend from claim 1.

The claims are objected to because they include reference characters which are not enclosed within parentheses.

Claims 17 and 26 are indefinite for not being in one-sentence form (i.e. the range for the ratio "h/d" appears after the period).

Claim 9 is rejected due to its dependence from claim 8.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 5-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Brabek (WO 02/02944 A1).

Brabek discloses a piston for a compressor having a cylinder with a compression chamber therein, the piston including, a head (11, 2) for reciprocating in the cylinder while making friction with an inside wall of the cylinder, to draw a working fluid into the compression chamber, compress, and discharge the working fluid, a skirt (7) extended from a lower end of the head spaced a predetermined distance away from the inside wall of the cylinder, and guide surfaces (6) each projected from an outside circumferential surface of the skirt for guiding reciprocating movement of the head while making friction with the inside wall of the cylinder, and a connecting rod connected between a crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the guide surfaces are provided along a length direction of the piston, at least two the guide surfaces are provided along a circumferential direction of the skirt at regular intervals, guide surface includes a continuous surface from an outside circumferential surface of the head, the outside circumferential surface of the skirt is provided at the same distance from a longitudinal axis of the piston, and the outside circumferential surface of the skirt has the same radius of curvature from the longitudinal axis of the piston.

Claims 1-3, 5, 8, and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Harrer et al (6152017).

Harrer et al discloses a piston (10) for a compressor having a cylinder with a compression chamber therein, the piston including, a head (14) for reciprocating in the cylinder while making friction with an inside wall of the cylinder, to draw a working fluid into the compression chamber, compress, and discharge the working fluid, a skirt (18) extended from a lower end of

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the head spaced a predetermined distance away from the inside wall of the cylinder, and guide surfaces (16) each projected from an outside circumferential surface of the skirt for guiding reciprocating movement of the head while making friction with the inside wall of the cylinder, and a connecting rod connected between a crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the guide surfaces are provided along a length direction of the piston, at least two the guide surfaces are provided along a circumferential direction of the skirt at regular intervals, guide surface includes a continuous surface from an outside circumferential surface of the head, the outside circumferential surface of the skirt has an elliptical curvature from the longitudinal axis of the piston, and the outside surface of the skirt and the outside surface of the guide surface are connected with a continuous surface without a step.

Note: Claims 8 and 9 have been treated as though they depend from claim 1.

Claims 10 and 12-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Riffe (5149254).

Riffe discloses a compressor (10) having a cylinder (14) having a compression chamber therein, a piston (29) having a projection (54) provided to a head in contact with the compression chamber for inserting into a discharge hole (38) provided for discharging a working fluid when the head is close to a top dead center, for reciprocating inside of the cylinder to draw the working fluid, and compress and discharge the working fluid, a connecting rod (31) connected between the crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the discharge hole has an intermediate part between opposite

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ends, having the same area, the projection has a height the same with a length of the discharge hole, the projection is at a position spaced away from a longitudinal axis of the piston, and the projection is conical with a fore end thereof cut away therefrom.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer et al (6152017) in view of Lengnick (2863707).

Harrer et al discloses a compressor as described above with respect to claim 1, but does not explicitly teach that the guide surface provided over a range of greater than 40 degrees along a circumferential direction of the skirt.

Lengnick discloses a piston (1) having a head (1a), a skirt (1b) depending from the head and spaced from a cylinder wall a predetermined distance, and guide sections (1c), wherein the guide sections are provided over a range of greater than 40 degrees along a circumferential direction of the skirt for bearing against the cylinder.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the piston of Harrer et al by having the guide surface provided over a range of greater than 40 degrees along a circumferential direction of the skirt as taught by Lengnick et al for the purpose of bearing against the cylinder and guiding the piston.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Riffe (5149254) in view of Iversen et al (6623258).

Riffe discloses a compressor as described above with respect to claim 10, but does not explicitly teach that the edges of opposite ends of the discharge hole are rounded.

Iversen et al discloses a discharge hole (11) for a compressor having a piston with a projection (10), wherein the edges of opposite ends of the discharge hole are rounded for reducing noise.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the compressor of Riffe by having the edges of opposite ends of the discharge hole rounded as taught by Iversen et al for the purpose of noise reduction.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riffe (5149254).

Riffe discloses a compressor as described above with respect to claim 10, but does not explicitly teach any dimensional relationships for the projection.

Since applicant has not disclosed that having the specific ratio ranges for the bottom to top diameters of the projection, or the height to top diameter of the projection solves any stated problem or is for any particular purpose above the fact that such dimensions could produce a desired flow characteristic and it appears that the projection of Riffe would perform equally well with dimensional relationships as claimed by applicant, it would have been an obvious matter of

design choice to modify the projection of Riffe by utilizing the dimensions as claimed for the purpose of controlling the discharge flow.

Claims 18, 19, 21, and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brabek (WO 02/02944 A1) in view of Riffe (5149254).

Brabek discloses a piston for a compressor having a cylinder with a compression chamber therein, the piston including, a head (11, 2) for reciprocating in the cylinder while making friction with an inside wall of the cylinder, to draw a working fluid into the compression chamber, compress, and discharge the working fluid, a skirt (7) extended from a lower end of the head spaced a predetermined distance away from the inside wall of the cylinder, and guide surfaces (6) each projected from an outside circumferential surface of the skirt for guiding reciprocating movement of the head while making friction with the inside wall of the cylinder, and a connecting rod connected between a crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the guide surfaces are provided along a length direction of the piston and are provided along a circumferential direction of the skirt at regular intervals, and the outside circumferential surface of the skirt has the same radius of curvature from the longitudinal axis of the piston. Brabek does not teach a projection provided to the head.

Riffe discloses a compressor (10) having a cylinder (14) having a compression chamber therein, a piston (29) having a projection (54) provided to a head in contact with the compression chamber for inserting into a discharge hole (38) provided for discharging a working fluid when the head is close to a top dead center, for reciprocating inside of the cylinder to draw the working fluid, and compress and discharge the working fluid, a connecting rod (31) connected between

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the crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the projection provides increased compression efficiency.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the compressor of Brabek to have the piston include a projection provided to the head for insertion into the discharge hole at top dead center as taught by Riffe for the purpose of improving compression efficiency.

In further regard to claims 23 and 24, Brabek, as modified, further teaches that the projection has a height the same with a length of the discharge hole, the projection is at a position spaced away from a longitudinal axis of the piston, and the projection is conical with a fore end thereof cut away therefrom.

Claims 25 and 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Brabek (WO 02/02944 A1) in view of Riffe (5149254) as applied to claim 24 above, and further in view of Design Choice.

Brabek, as modified, discloses a compressor as described above with respect to claim 18, but does not explicitly teach any dimensional relationships for the projection.

Since applicant has not disclosed that having the specific ratio ranges for the bottom to top diameters of the projection, or the height to top diameter of the projection solves any stated problem or is for any particular purpose above the fact that such dimensions could produce a desired flow characteristic and it appears that the projection of Brabek, as modified, would perform equally well with dimensional relationships as claimed by applicant, it would have been

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an obvious matter of design choice to modify the projection of Brabek, as modified, by utilizing the dimensions as claimed for the purpose of controlling the discharge flow.

Claims 18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer et al (6152017) in view of Riffe (5149254).

Harrer et al discloses a piston (10) for a compressor having a cylinder with a compression chamber therein, the piston including, a head (14) for reciprocating in the cylinder while making friction with an inside wall of the cylinder, to draw a working fluid into the compression chamber, compress, and discharge the working fluid, a skirt (18) extended from a lower end of the head spaced a predetermined distance away from the inside wall of the cylinder, and guide surfaces (16) each projected from an outside circumferential surface of the skirt for guiding reciprocating movement of the head while making friction with the inside wall of the cylinder, and a connecting rod connected between a crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the outside circumferential surface of the skirt has an elliptical curvature from the longitudinal axis of the piston.

Riffe discloses a compressor (10) having a cylinder (14) having a compression chamber therein, a piston (29) having a projection (54) provided to a head in contact with the compression chamber for inserting into a discharge hole (38) provided for discharging a working fluid when the head is close to a top dead center, for reciprocating inside of the cylinder to draw the working fluid, and compress and discharge the working fluid, a connecting rod (31) connected between

the crankshaft and the piston, for converting rotation of the crankshaft into a linear reciprocating movement of the piston. Wherein the projection provides increased compression efficiency.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the compressor of Harrer et al to have the piston include a projection provided to the head for insertion into the discharge hole at top dead center as taught by Riffe for the purpose of improving compression efficiency.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrer et al (6152017) in view of Riffe (5149254) as applied to claim 18 above, and further in view of Lengnick (2863707).

Harrer et al, as modified, discloses a compressor as described above with respect to claim 18, but does not explicitly teach that the guide surface provided over a range of greater than 40 degrees along a circumferential direction of the skirt.

Lengnick discloses a piston (1) having a head (1a), a skirt (1b) depending from the head and spaced from a cylinder wall a predetermined distance, and guide sections (1c), wherein the guide sections are provided over a range of greater than 40 degrees along a circumferential direction of the skirt for bearing against the cylinder.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the piston of Harrer et al, as modified, by having the guide surface provided over a range of greater than 40 degrees along a circumferential direction of the skirt as taught by Lengnick et al for the purpose of bearing against the cylinder and guiding the piston.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Leslie whose telephone number is (571) 272-4819. The examiner can normally be reached on M-F 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look can be reached on (571) 272-4820. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ML
August 13, 2007

**/Michael Leslie/
Primary Examiner
AU 3745**